

CLAIM AMENDMENTS

We claim:

1. (Currently Amended) A device for producing quantum effects, comprising:
a material fashioned into an elongated fiber shape;
one or more control paths which carry energy along said material;
a plurality of quantum dots, physically connected with said material and energetically connected to said control paths; wherein
the energy carried in said control paths actuate the quantum dots to trap and hold a controlled configuration of charge carriers, thus forming artificial atoms whose size, shape, atomic number, and/or energy level are dependent on the energies in said control paths.
2. (Previously Presented) The device of claim 1, wherein said control paths are electrical wires, whether conductors, semiconductors, or superconductors, which create electrical potentials across the quantum dots.
3. (Previously Presented) The device of claim 1, wherein said control paths are optical fibers carrying light or laser energy.
4. (Previously Presented) The device of claim 1, wherein said control paths are radio frequency or microwave antennas.
5. (Previously Presented) The device of claim 1, wherein the quantum dots are quantum dot particles.
6. (Previously Presented) The device of claim 1, wherein the quantum dots are quantum dot devices.
7. (Currently Amended) A method for controlling dopants in the interior of a bulk material in real time, after a time of initial manufacture, the method comprising:
confining charge carriers in the bulk material in a dimension smaller than the de Broglie wavelength of said charge carriers, such that the charge carriers assume a quantum wavelike behavior in all three dimensions in at least one confinement region;
carrying energy through at least one conduit in said solid material to said charge carriers in the at least one confinement region, without said energy directly contacting said solid material except through said at least one conduit; and

controlling said energy so that artificial atoms are formed by the charge carriers in the confinement region, whose properties can be adjusted in real time;

whereby said artificial atoms serve as programmable dopants to alter the electrical, optical, thermal, magnetic, mechanical, and/or chemical properties of said bulk material in real time.

8. (Currently Amended) The method of claim 7, wherein the step of confining said charge carriers further comprises:

attaching a ~~is a~~ plurality of quantum dot particles or quantum dot devices to the bulk material; and

energetically connecting said ~~said~~ quantum dot particles or quantum dot devices with said at least on conduit.

9. (Previously Presented) The device of claim 1, wherein only the atomic number and energy level of the artificial atoms can be controlled.

10. (Previously Presented) The device of claim 1, wherein only the energy level of the artificial atoms can be controlled.

11. (Previously Presented) The device of claim 1, wherein the material further comprises:

a first barrier layer;

a second barrier layer;

a transport layer located between the first barrier layer and the second barrier layer; and

a plurality of electrodes connected with the control paths; wherein

when energized, the plurality of electrodes interact with the first barrier layer, the second barrier layer, and the transport layer to create at least one quantum well that functions as a quantum dot device.

12. (Previously Presented) The device of claim 1, wherein the material further comprises a memory layer that switches the energy carried to a first confinement region from a first one to a second one of the one or more control paths.

13. (Previously Presented) The device of claim 1, wherein said one or more control paths comprises a single wire.

14. (Previously Presented) The device of claim 1 further comprising an insulating medium, wherein said one or more control paths are positioned in said insulating medium and insulated from each other.

15. (Currently Amended) The device of claim 1, wherein said ~~solid~~ material is embedded inside a bulk material, serving as a programmable dopant capable of altering the electrical, optical, thermal, magnetic, mechanical, and or chemical properties of said bulk material in real time based on the energies in said control paths.

16. (Currently Amended) The device of claim 1, wherein said device comprises a plurality of fibers of said solid material woven, braided, ~~[[,]]~~ stacked, or ~~otherwise~~ arranged into two- or three-dimensional structures.

17. (Previously Presented) The device of claim 1, wherein said fiber shape is of a shape selected from the group consisting of: a wire, a ribbon, and an optical fiber.

18. (New) The device of Claim 2, wherein said electrical wires are conductive metallic wires.

19. (New) The device of Claim 1, wherein said control paths are carbon nanotubes.